

RECEIVED  
CENTRAL FAX CENTER

OCT 13 2006

Docket No. 740756-2670

Serial No. 10/713,219

Page 2

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method for fabricating a thin film transistor, comprising:
  - forming a first amorphous semiconductor film;
  - forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;
  - heating the first amorphous semiconductor film to form a first crystalline semiconductor film;
  - forming a second amorphous semiconductor film over the first crystalline semiconductor film by sputtering;
  - heating the first crystalline semiconductor film and the second amorphous semiconductor film; and
  - removing the second amorphous semiconductor film, wherein the second amorphous semiconductor film serves as a gettering sink, and
  - wherein the second amorphous semiconductor film comprises nitrogen at a concentration of  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen at a concentration of  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas at a concentration of  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.
2. (Withdrawn) A method for fabricating a thin film transistor, comprising:
  - forming a first amorphous semiconductor film;
  - forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;
  - forming a first crystalline semiconductor film by heating the first amorphous semiconductor film;
  - irradiating the first crystalline semiconductor film with a laser beam;
  - forming a second amorphous semiconductor film over the first crystalline semiconductor film;

10156302.2

BEST AVAILABLE COPY

Docket No. 740756-2670

Serial No. 10/713,219

Page 3

heating the first crystalline semiconductor film and the second amorphous semiconductor film;

removing the second amorphous semiconductor film; and

wherein the amorphous semiconductor film contains nitrogen concentration is  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen concentration is  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas concentration is  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

3. (Currently Amended) A method for fabricating a thin film transistor, comprising:

forming a first amorphous semiconductor film;

forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;

forming a second amorphous semiconductor film over the first amorphous semiconductor film by sputtering;

heating the first amorphous semiconductor film and the second amorphous semiconductor film; and

removing the second amorphous semiconductor film ,

wherein the second amorphous semiconductor film serves as a gettering sink, and

wherein the second amorphous semiconductor film comprises nitrogen at a concentration of  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen at a concentration of  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas at a concentration of  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

4. (Withdrawn) A method for fabricating a thin film transistor, comprising:

forming a first amorphous semiconductor film;

forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;

forming a first crystalline semiconductor film by heating the first amorphous semiconductor film;

forming a second amorphous semiconductor film over the first crystalline semiconductor film;

10156302.2

Docket No. 740756-2670

Serial No. 10/713,219

Page 4

moving the metal element into the second amorphous semiconductor film by heating the first crystalline semiconductor film and the second amorphous semiconductor film;  
removing the second amorphous semiconductor film; and  
wherein the second amorphous semiconductor film contains nitrogen concentration is  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen concentration is  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas concentration is  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

5. (Withdrawn) A method for fabricating a thin film transistor, comprising:  
forming a first amorphous semiconductor film;  
forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;  
forming a first crystalline semiconductor film by heating the first amorphous semiconductor film;  
forming a second amorphous semiconductor film over the first crystalline semiconductor film;  
performing gettering by heating the first crystalline semiconductor film and the second amorphous semiconductor film;  
removing the second amorphous semiconductor film; and  
wherein the amorphous semiconductor film contains nitrogen concentration is  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen concentration is  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas concentration is  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

6. (Withdrawn) A method for fabricating a thin film transistor, comprising:  
forming a first amorphous semiconductor film;  
forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;  
forming a first crystalline semiconductor film by heating the first amorphous semiconductor film;  
forming a barrier film over the first crystalline semiconductor film;  
forming a second amorphous semiconductor film over the barrier film;

10156302.2

Docket No. 740756-2670

Serial No. 10/713,219

Page 5

heating the first crystalline semiconductor film and the second amorphous semiconductor film;

removing the second amorphous semiconductor film and the barrier film, and

wherein the second amorphous semiconductor film contains nitrogen concentration is  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen concentration is  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas concentration is  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

7. (Withdrawn) A method for fabricating a thin film transistor according to Claim 6, wherein the barrier film is an oxide film made by using ozone water or a mixed solution of hydrogen peroxide solution and sulfuric acid, hydrochloric acid or nitric acid.

8. (Canceled)

9. (Withdrawn) A method for fabricating a thin film transistor according to claim 2, wherein the second amorphous semiconductor film is formed by sputtering.

10. (Canceled)

11. (Withdrawn) A method for fabricating a thin film transistor according to claim 4, wherein the second amorphous semiconductor film is formed by sputtering.

12. (Withdrawn) A method for fabricating a thin film transistor according to claim 5, wherein the second amorphous semiconductor film is formed by sputtering.

13. (Withdrawn) A method for fabricating a thin film transistor according to claim 6, wherein the second amorphous semiconductor film is formed by sputtering.

14. (Withdrawn) A method for fabricating a thin film transistor, comprising:  
forming a first amorphous semiconductor film;

10156302.2

Docket No. 740756-2670

Serial No. 10/713,219

Page 6

forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;

forming a first crystalline semiconductor film by heating the first amorphous semiconductor film;

forming a second amorphous semiconductor film over the first crystalline semiconductor film;

heating the first crystalline semiconductor film and the second amorphous semiconductor film;

removing the second amorphous semiconductor film;

wherein the second amorphous semiconductor film is formed by sputtering in a state in which a flammable gas and a noble gas are supplied to a film formation chamber, oxygen concentration in the film formation chamber is reduced, and the supply of the flammable gas is stopped; and

wherein the second amorphous semiconductor film contains nitrogen concentration is  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen concentration is  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas concentration is  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

15. (Withdrawn) A method for fabricating a thin film transistor according to Claim 14, wherein the flammable gas is one element or more elements selected from a group consisting of SiH<sub>4</sub>, Si<sub>2</sub>H<sub>6</sub>, SiH<sub>2</sub>Cl<sub>2</sub>, SiHCl<sub>3</sub>, SiCl<sub>4</sub>, GeH<sub>4</sub>, PH<sub>3</sub>, B<sub>2</sub>H<sub>6</sub>, AsH<sub>3</sub>, and H<sub>2</sub>Se.

16. (Withdrawn) A method for fabricating a thin film transistor, comprising:

forming a first amorphous semiconductor film;

forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;

forming a first crystalline semiconductor film by heating the first amorphous semiconductor film;

forming a second amorphous semiconductor film over the first crystalline semiconductor film;

heating the first crystalline semiconductor film and the second amorphous semiconductor film;

10156302.2

Docket No. 740756-2670

Serial No. 10/713,219

Page 7

removing the second amorphous semiconductor film;

wherein the second amorphous semiconductor film is formed by sputtering in a state in which a filament including Ti that is disposed in a film formation chamber is heated, oxygen concentration in the film formation chamber is reduced, and the heating of the filament is stopped; and

wherein the second amorphous semiconductor film contains nitrogen concentration is  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen concentration is  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas concentration is  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

17. (Withdrawn) A method for fabricating a thin film transistor, comprising:

forming a first amorphous semiconductor film;

forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;

forming a first crystalline semiconductor film by heating the first amorphous semiconductor film;

forming a second amorphous semiconductor film over the first crystalline semiconductor film;

heating the first crystalline semiconductor film and the second amorphous semiconductor film;

removing the second amorphous semiconductor film;

wherein the second amorphous semiconductor film is formed by sputtering in a state in which a voltage is applied between electrodes including Ti disposed in a film formation chamber to generate a plasma, oxygen concentration in the film formation chamber is reduced, and applying the voltage between the electrodes is stopped; and

wherein the second amorphous semiconductor film contains nitrogen concentration is  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen concentration is  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas concentration is  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

18. (Currently Amended) A method for fabricating a thin film transistor according to claim 1, wherein the second amorphous semiconductor film is removed by wet etching using hydrazine or tetramethyl ammonium ~~ammonium~~ hydroxide.

10156302.2

Docket No. 740756-2670

Serial No. 10/713,219

Page 8

19. (Withdrawn) A method for fabricating a thin film transistor according to claim 2, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

20. (Previously presented) A method for fabricating a thin film transistor according to claim 3, wherein the second amorphous semiconductor film is removed by wet etching using hydrazine or tetramethyl ammonium hydroxide.

21. (Withdrawn) A method for fabricating a thin film transistor according to claim 4, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

22. (Withdrawn) A method for fabricating a thin film transistor according to claim 5, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

23. (Withdrawn) A method for fabricating a thin film transistor according to claim 6, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

24. (Withdrawn) A method for fabricating a thin film transistor according to claim 14, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

25. (Withdrawn) A method for fabricating a thin film transistor according to claim 16, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

10156302.2

Docket No. 740756-2670

Serial No. 10/713,219

Page 9

26. (Withdrawn) A method for fabricating a thin film transistor according to claim 17, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.
27. (Original) A method for fabricating a thin film transistor according to claim 1, wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).
28. (Withdrawn) A method for fabricating a thin film transistor according to claim 2, wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).
29. (Original) A method for fabricating a thin film transistor according to claim 3, wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).
30. (Withdrawn) A method for fabricating a thin film transistor according to claim 4, wherein the noble gas element is one element or more elements selected from a group consisting of: helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).
31. (Withdrawn) A method for fabricating a thin film transistor according to claim 5, wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).
32. (Withdrawn) A method for fabricating a thin film transistor according to claim 6, wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).
33. (Withdrawn) A method for fabricating a thin film transistor according to claim 14, wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).

10156302.2



Docket No. 740756-2670

Serial No. 10/713,219

Page 10

34. (Withdrawn) A method for fabricating a thin film transistor according to claim 16, wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).

35. (Withdrawn) A method for fabricating a thin film transistor according to claim 17, wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).

36. (Original) A method for fabricating a thin film transistor according to claim 1, wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), platinum (Pt), copper (Cu), and gold (Au).

37. (Withdrawn) A method for fabricating a thin film transistor according to claim 2, wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), platinum (Pt), copper (Cu), and gold (Au).

38. (Original) A method for fabricating a thin film transistor according to claim 3, wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), platinum (Pt), copper (Cu), and gold (Au).

39. (Withdrawn) A method for fabricating a thin film transistor according to claim 4, wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ti), platinum (Pt), copper (Cu), and gold (Au).

40. (Withdrawn) A method for fabricating a thin film transistor according to claim 5, wherein the metal element is one element or more elements selected from a group

10156302.2

Docket No. 740756-2670

Serial No. 10/713,219

Page 11

consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), platinum (Pt), copper (Cu), and gold (Au).

41. (Withdrawn) A method for fabricating a thin film transistor according to claim 6, wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), platinum (Pt), copper (Cu), and gold (Au).

42. (Withdrawn) A method for fabricating a thin film transistor according to claim 14, wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), platinum (Pt), copper (Cu), and gold (Au).

43. (Withdrawn) A method for fabricating a thin film transistor according to claim 16, wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ti), platinum (Pt), copper (Cu), and gold (Au).

44. (Withdrawn) A method for fabricating a thin film transistor according to claim 17, wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), platinum (Pt), copper (Cu), and gold (Au).

10156302.2